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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/665,011	09/22/2003	Akira Gyoutoku	P24284	5831

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GREENBLUM & BERNSTEIN, P.L.C.
1950 ROLAND CLARKE PLACE
RESTON, VA 20191

EXAMINER
PHAM, HAI CHI

ART UNIT	PAPER NUMBER
2861	

DATE MAILED: 04/25/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/665,011	GYOUTOKU ET AL.	
	Examiner	Art Unit	
	Hai C. Pham	2861	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☐ Responsive to communication(s) filed on _____.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-39* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-20,23-27,29-32 and 34-39* is/are rejected.

7)☒ Claim(s) *21,22,28 and 33* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *22 September 2003* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date *02/12/04, 11/03/04*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Election/Restrictions

1. Applicant's election with traverse of Group I in the reply filed on 02/17/06 is acknowledged. Applicants' traversal of the restriction requirement had been carefully studied. Applicants' arguments are found persuasive and the restriction requirement is hereby withdrawn.

Claim Objections

2. The following claims are objected to because of the following informalities:

Claim 10:

- Line 1, "unit" should read --element--.

Claim 10:

- Line 2, "layers comprise" should read --layer comprises--.

Claim 20:

- Claim 20 should be dependent form claim 18 instead of the base claim 15, which does not recite the "waveguide".

Appropriate correction is required.

Claim Rejections - 35 USC § 102

3. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (e) the invention was described in a patent granted on an application for patent by another filed in the United States before the invention thereof by the applicant for patent, or on an international application by another who has fulfilled the requirements of paragraphs (1), (2), and (4) of section 371(c) of this title before the invention thereof by the applicant for patent.

The changes made to 35 U.S.C. 102(e) by the American Inventors Protection Act of 1999 (AIPA) and the Intellectual Property and High Technology Technical Amendments Act of 2002 do not apply when the reference is a U.S. patent resulting directly or indirectly from an international application filed before November 29, 2000. Therefore, the prior art date of the reference is determined under 35 U.S.C. 102(e) prior to the amendment by the AIPA (pre-AIPA 35 U.S.C. 102(e)).

4. Claims 1-2, 4-13 are rejected under 35 U.S.C. 102(e) as being anticipated by Tsutsui (Pub. No. U.S. 2004/0027059).

Tsutsui discloses in Figs. 1 and 7A an organic electroluminescence element comprising, on a substrate (not shown) (paragraph [0079]), an anode (electrode 101) which acts as a hole injection electrode, a cathode (electrode 102) which acts as an electron injection electrode, a plurality of light emission layers (electroluminescent films 103-1 and 103-2) each having a light emission region, and a charge generation layer (bipolar carrier generation layer 104) (paragraph [0034]), which injects electrons into a light emission layer arranged close to said anode and holes into a light emission layer arranged close to said cathode (Fig. 4A), and said light emission layers and said charge generation layer being arranged between said anode and said cathode (Fig. 1), wherein the work function of said charge generation layer is configured higher than the ionization

potential of said light emission layer arranged close to said anode (paragraphs [0072]-[0073]).

With regard to claim 2, Tsutsui teaches the electron affinity of said charge generation layer is configured lower than the electron affinity of the light emission layer arranged close to said anode, and wherein the ionization potential of said charge generation layer is configured higher than the ionization potential of the light emission layer arranged close to said cathode (Figs. 4A-4B) (also paragraphs [0067], [0072]).

With regard to claim 8, Tsutsui teaches the a plurality of light emission layers (203-1 and 203-2 of Fig. 1 or 610 and 611 of Fig. 6A) each having a light emission region and fabricated between said anode (101) and said cathode (102) with intervening buffer layers (bipolar carrier generation layer 104) made of a wide gap semiconductor (the bipolar carrier generation layer 104 is made of semiconductor having a wide band gap) (paragraph [0064]).

Tsutsui further teaches:

- said charge generation layer is made of a dielectric material and the relative permittivity of said charge generation layer is larger than that of said light emission layer (paragraphs [0010], [0014], [0062]),
- said charge generation layer (Fig. 5) comprises at least a first generation layer (204-1) lying in the side of the light emission layer arranged close to said anode and a second generation layer (204-2) lying in the side of the light emission layer arranged close to said cathode, wherein said first generation layer is configured at a lower electron affinity compared to that of said second generation layer, and

said second generation layer is configured at a higher ionization potential compared to that of said first generation layer (as shown in Fig. 7B, the charge generating layer facing the anode is at a lower electron affinity than facing the cathode),

- the light emission layer arranged close to said anode and the light emission layer arranged close to said cathode are made of the same material mutually (paragraphs [0079]-[0082]),
- any of organic thin film layers constituted by the light emission layer or a hole transport layer or an electron transport layer which is formed on the light emission layer if necessary, and provided in contact with the charge generation layer on the substrate side is formed by a polymer material (paragraphs [0101], [0103], [0107]),
- all organic thin film layers constituted by the light emission layer or a hole transport layer or an electron transport layer which is provided on the light emission layer if necessary are formed by a polymer material (paragraphs [0101], [0103], [0107]),
- said charge generation layer comprises a high polymer-based organic film (the charge generating layer 601 includes a conductive film 602 sandwiched between two intrinsic semiconductor layers 603, which are made of a redox polymer) (paragraph [0071]),
- the drying temperature (e.g., 60°C) for the organic thin film layer arranged close to said cathode is one not exceeding the glass transition temperature (known as

being about 200°C) of the light emission layer arranged close to said anode (paragraphs [0095], [0100]).

With regard to claims 5 and 12, the recited limitations were not given patentable weight since "[E]ven though product-by-process claims are limited by and defined by the process, determination of patentability is based on the product itself". The patentability of a product does not depend on its method of production. If the product in the product-by-process claim is the same as or obvious from a product of the prior art, the claim is unpatentable even though the prior product was made by a different process. In re Thorpe, 777 F.2d 695, 698, 227 USPQ 964, 966 (Fed. Cir. 1985). See MPEP 2111.

Claim Rejections - 35 USC § 103

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

6. Claim 3 is rejected under 35 U.S.C. 103(a) as being unpatentable over Tsutsui in view of Nakaya et al. (U.S. 5,792,557).

Tsutsui discloses all the basic limitations of the claimed invention except for the potential difference between the electron affinity of the light emission layer arranged close to said anode and the electron affinity of said charge generation layer, and the potential difference between the ionization potential of the light emission layer arranged

close to said anode and the ionization potential of said charge generation layer are both configured 0.6 eV or less.

Nakaya et al. discloses an organic EL element wherein the difference in ionization potential and the difference between the hole injecting and transporting layer and a layer having a light emitting or luminescent function, which determines the carrier density and mobility, is set at a level between 0.25 to 0.40 eV (col. 122, lines 42-58).

It would have been obvious at the time the invention was made to a person having ordinary skill in the art to modify the device of Tsutsui with the aforementioned teaching of Nakaya et al. The motivation for doing so would have been to optimize the effectiveness of the carrier recombination and light emission.

7. Claims 14-19, 24-27, 29-30, 32, 34-39 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kawase (U.S. 6,472,817) in view of Tsutsui.

Kawase, an acknowledged prior art, discloses an organic light emitting device for use as a light source in a printing system, the device comprising a substrate (18) (Fig. 6), an anode (4) which acts as a hole injection electrode, a cathode (2), which acts as an electron injection electrode, and a light emission layer (6) having a light emission region.

However, Kawase fails to teach the light emission layer consisted of a plurality of layers, and a charge generation layer which injects electrons into a light emission layer arranged close to said anode and holes into a light emission layer arranged close to said cathode, and said light emission layers and said charge generation layer being

arranged between said anode and said cathode, the plural light emission layers being made of the same material and being made of a high polymer material, the organic electroluminescence element is driven by alternating current, alternating voltage or wave pulse, and the wherein the thickness of the light emission layer being thicker than that of the electrodes.

Tsutsui teaches an organic light-emitting element used as a light source, which includes a plurality of light emitting layers (103-1, 103-2) and a charge generation layer (104), which injects electrons into a light emission layer arranged close to an anode (101) and holes into a light emission layer arranged close to a cathode (102), and said light emission layers and said charge generation layer being arranged between said anode and said cathode, as driven by an alternating voltage (Fig. 3), the plural light emission layers being made of the same polymer material (paragraphs [0101], [0103], [0107]). Tsutsui further teaches the light emission layer having a thickness of 200 nm while the transparent electrode ITO has a thickness of 100 nm (paragraph [0111]).

It would have been obvious at the time the invention was made to a person having ordinary skill in the art to incorporate the plural light emitting layers and the charge generation layer into the device of Kawase as taught by Tsutsui. The motivation for doing so would have been to release at least two times the amount of light by the same amount of supplied current as compared to an organic electroluminescent device having only one layer as suggested by Tsutsui at paragraph [0031].

Kawase further teaches:

- a waveguide (16) the end plane of which in the sub-scanning direction is configured as the light emerging plane (the light emerges from the side surface of the waveguide), and the light which emits from said organic electroluminescence element, incident on said waveguide, and emerges from said light emerging plane as the exposure light,
- a plurality of said waveguides optically isolated from each other are arranged for each pixel in parallelism along the sub-scanning direction to each other (a plurality of waveguides 16 carrying light from the respective number of OLEDs) (col. 5, lines 39-41),
- said light emerging plane has a shape corresponding to the shape of the pixel (the OLEDs being arranged each with their own respective waveguide) (col. 5, lines 39-41),
- in said waveguide, an angle conversion unit (Distributed Bragg Reflector DBR 24) is formed that converts the angle of the light impinging on said waveguide from said light emission layer to guide to said light emerging plane,
- said angle conversion unit guides the light in the directions other than the sub-scanning direction to said light emerging plane (e.g., along the length of the waveguide perpendicular to the side surface of the waveguide),
- said angle conversion unit conducts angle conversion for the direction perpendicular to both of the main and sub-scanning directions to guide the light to said light emerging plane (e.g., along the length of the waveguide perpendicular to the side surface of the waveguide),

- a reflection layer is formed at least either on the plane facing said light emerging plane or on the plane of said waveguide located at the side opposite to said light emission layer (Distributed Bragg Reflector DBR 24 being formed on the plane of said waveguide 16 located at the side opposite to said light emission layer) (Fig. 9),
- said light emerging plane is provided with means for diffusion suppression that suppresses the diffusion of the light emerged from said light emerging plane (the thick waveguide 16 providing a high intensity of light outputted from the light emerging plane with a small divergence angle) (col. 5, lines 15-18),
- a photoreceptor in which an electrostatic latent image is formed by means of said exposure unit (col. 5, lines 45-53).

8. Claims 15-20, 24-25, 29, 32, 34-39 are rejected under 35 U.S.C. 103(a) as being unpatentable over Iwamatsu et al. (Pub. No. U.S. 2005/0151824) in view of Tsutsui.

Iwamatsu et al. discloses in Fig. 1 an exposure unit having a plurality of organic light emitting elements, each comprising a substrate (1), an anode (12) which acts as a hole injection electrode, a cathode (15), which acts as an electron injection electrode, and a light emission layer (2) having a light emission region.

However, Iwamatsu et al. fails to teach the light emission layer consisted of a plurality of layers, and a charge generation layer which injects electrons into a light emission layer arranged close to said anode and holes into a light emission layer arranged close to said cathode, and said light emission layers and said charge

generation layer being arranged between said anode and said cathode, the plural light emission layers being made of the same material and being made of a high polymer material, the organic electroluminescence element is driven by alternating current, alternating voltage or wave pulse, and the wherein the thickness of the light emission layer being thicker than that of the electrodes.

Tsutsui teaches an organic light-emitting element used as a light source, which includes a plurality of light emitting layers (103-1, 103-2) and a charge generation layer (104), which injects electrons into a light emission layer arranged close to an anode (101) and holes into a light emission layer arranged close to a cathode (102), and said light emission layers and said charge generation layer being arranged between said anode and said cathode, as driven by an alternating voltage (Fig. 3), the plural light emission layers being made of the same polymer material (paragraphs [0101], [0103], [0107]). Tsutsui further teaches the light emission layer having a thickness of 200 nm while the transparent electrode ITO has a thickness of 100 nm (paragraph [0111]).

It would have been obvious at the time the invention was made to a person having ordinary skill in the art to incorporate the plural light emitting layers and the charge generation layer into the device of Iwamatsu et al. as taught by Tsutsui. The motivation for doing so would have been to release at least two times the amount of light by the same amount of supplied current as compared to an organic electroluminescent device having only one layer as suggested by Tsutsui at paragraph [0031].

Iwamatsu et al. further discloses:

- a waveguide (3) the end plane of which in the sub-scanning direction is configured as the light emerging plane (the light emerges from the side surface of the waveguide), and the light which emits from said organic electroluminescence element, incident on said waveguide, and emerges from said light emerging plane as the exposure light,
- a plurality of said waveguides optically isolated from each other (the shading wall 7 for preventing crosstalk) (paragraph [0071]) are arranged for each pixel in parallelism along the sub-scanning direction to each other (the emissive elements being arranged in one line so as to meet the resolution of at least 600 dpi) (paragraph [0078]),
- a light-shielding layer (shading wall 7) or a light reflection layer (the waveguide clad layer 6 provides a total reflection face of the waveguide) is provided between each of said waveguides adjacent to each other,
- said waveguide comprises a core (5) having a specified refractive index, and a clad (6) that is formed around the outer periphery of said core and has a refractive index smaller than that of said core (paragraph [0072]),
- said light emerging plane has a shape corresponding to the shape of the pixel (the limit of the emitting area on the emitting surface of the waveguide is based on the resolution as well as the lateral magnification) (paragraph [0078]),
- in said waveguide, an angle conversion unit is formed that converts the angle of the light impinging on said waveguide from said light emission layer to guide to said light emerging plane (the waveguide clad layer 6 provides a total reflection

face of the waveguide to an angle so as to guide the incident light emitted from the emissive layer toward the light emerging plane) (paragraph [0071]),

- a reflection layer is formed at least either on the plane facing said light emerging plane or on the plane of said waveguide located at the side opposite to said light emission layer (e.g., the waveguide clad layer 6 provides a total reflection face of the waveguide) (paragraphs [0071], [0076]),
- a photoreceptor in which an electrostatic latent image is formed by means of said exposure unit (paragraph [0096]).

9. Claim 31 is rejected under 35 U.S.C. 103(a) as being unpatentable over Iwamatsu et al. in view of Tsutsui, as applied to claims 15, 18 above, and further in view of Yasuda (U.S. 6,798,440).

Iwamatsu et al. in view of Tsutsui discloses all the basic limitations of the claimed invention except for the light emerged from said light emerging plane focuses on the photoreceptor as an erect image of an actual size.

Yasuda discloses a printer comprising an organic light emitting device array, and an imaging optical system (21) for forming an erected image in the main scanning direction.

It would have been obvious at the time the invention was made to a person having ordinary skill in the art to provide the device of Iwamatsu et al. with an optical system for forming an erected image as taught by Yasuda. The motivation for doing so would have been to increase the energy density of the recording light.

Allowable Subject Matter

10. Claims 21-22, 28, 33 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

11. The following is a statement of reasons for the indication of allowable subject matter: the primary reason for the indication of the allowability of claim 21 is the inclusion therein, in combination as currently claimed, of the limitation "said core has a refractive index smaller than that of said light emission layers", which is not found taught by the prior art of record considered alone or in combination.

The primary reason for the indication of the allowability of claim 22 is the inclusion therein, in combination as currently claimed, of the limitation "the refractive index of said core is larger than the value obtained by subtracting 0.3 from the refractive index of said light emission layer", which is not found taught by the prior art of record considered alone or in combination.

The primary reason for the indication of the allowability of claim 28 is the inclusion therein, in combination as currently claimed, of the limitation "said angle conversion unit is formed at the interface between said core and clad located at the opposite side of said light emission layer", which is not found taught by the prior art of record considered alone or in combination.

The primary reason for the indication of the allowability of claim 33 is the inclusion therein, in combination as currently claimed, of the limitation "the organic

electroluminescence element is applied a negative voltage between said anode and said cathode during the period of no light emission", which is not found taught by the prior art of record considered alone or in combination.

Pertinent Prior Art

12. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Kido et al. (Pub. No. U.S. 2003/0189401) discloses an organic electroluminescent device having a cathode, an anode, a plurality of light emissive layers and a charge generation layer.

Contact Information

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Hai C. Pham whose telephone number is (571) 272-2260. The examiner can normally be reached on M-F 8:30AM - 5:30PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Stephen D. Meier can be reached on (571) 272-2149. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Hai Pham

HAI PHAM
PRIMARY EXAMINER
April 22, 2006